FLIGHT
The AIRCRAFT ENGINEER & AIRSHIPS

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1924

Jan. 9 .... "Water-Cooled Aero Engines," by A. J. Rowledge, before Inst. of Automobile Engineers

Jan. 10 .... "Materials from the Aeronautical Point of View," by Dr. Aitchison and Mr. North before R.Ae.S.

Jan. 24 .... "Fabric and Dopes," by Dr. Ramsbottom, before R.Ae.S.

Feb. 7 .... "Airmanship at Sea," by Sqd.-Ldr. Maycock, O.B.E., R.A.F., before R.Ae.S.

Feb. 21 .... "Aerial Photography and Survey," by Mr. H. Hamshaw Thomas, before R.Ae.S.

Mar. 1 .... French Aero Engine Competition

Mar. 6 .... "Sound Detection," by Major Tucker, before R.Ae.S.

Mar. 20 .... "The Report of the Aeronautical Research Committee's Panel on Scale Effect," by Capt. W. S. Farren

April 3 .... "The British Aviation Mission to the Imperial Japanese Navy," by Colonel the Master of Sempill

EDITORIAL COMMENT.

IN some respects the year that is just drawing to a close has been a notable one, and in others it has proved somewhat disappointing. Perhaps, when all is told, 1923 may best be characterised by saying that it was a year of laying foundations for the future, rather than a year of great actual achievement. Certain outstanding performances attained during 1923 mark peaks on the curve of progress, but in most cases they were exceptional individual efforts. On the other hand, the year has not been altogether without its depressions; disappointment at unfulfilled hopes has not been entirely absent, and as in previous years toll of lives has been taken. Nevertheless, on looking back there is much in 1923 of which to be proud, and for which to be thankful. Much extremely useful work has been done in the quiet of the laboratory or the drawing office: work that will bear fruit during the coming months and years, even if immediate results are not to be hoped for. In the space available in this week's issue of FLIGHT it is not possible to give anything in the nature of a complete review of the events of the year at home, much less of all that has taken place throughout the world. The best that can be done is to make a very brief reference to some of the events likely to prove of lasting influence, and to such achievements as may be considered of importance in the future progress of the art, science and practice of aviation.

On and from January 1 the £1,000 Prize offered by Mr. Gordon Selfridge for a gliding flight of 50 miles was open for competition. At the time of going to press this week the prize has not been won, and, in fact, no attempt to win it has been made. There is just a possibility that Mr. Gray, of Berwick-on-Tweed, may endeavour to win the prize before the end of the year. Towards the end of the month Maneyrol succeeded, at Vauville, near Cherbourg, in remaining aloft on his Peyret glider for 8 hours 6 minutes, thus beating Thoret's "record." Early in February Thoret took the lead again with 8 hours 36 minutes.

Early in the year—on January 3, to be exact—a

new " world's record " for gliders was established by the French aviator Lieut. Thoret, who remained aloft for 7 hours 3 minutes at Biskra. He was using a Hanriot school machine with 80 h.p. le Rhone engine, but stopped his engine when a suitable current had been found. This exploit showed that, given suitable conditions there is no reason why a glider should not remain up for 12 hours, or 24 hours, for that matter, provided the pilot can stand the strain. From a scientific point of view this form of gliding has no longer any interest.

During the second week in January a Junkers all-metal monoplane paid a flying visit to Croydon, following the reading of a paper by Professor Junkers before the Royal Aeonautical Society. It is scarcely likely that the methods of construction developed by Professor Junkers will find favour in this country, but the visit of the machine to Croydon provided an excellent opportunity of examining in some detail a form of construction that has found considerable application in Germany.

Although referring to an event that took place in 1922, the homologation in January by the F.A.I. of four world's records for seaplanes, established by Capt. Biard on a Napier-engined Supermarine flying boat at the Schneider Cup race at Naples, marked a milestone in British aviation, and incidentally proved the last records to be held by this country. Before the end of the year they had passed out of the country. They were for speed over 100 and 200 kms., for duration, and for distance.

February opened with a very fine performance by the Gloucestershire Aircraft Company's " Mars I " (Napier " Lion " engine), which on official tests at Martlesham Heath climbed to a height of 20,000 ft. in the remarkably short time of 12 mins. 24 secs. During the same month the Third Air Conference was held at the Guildhall, the members having previously paid a visit to the Croydon aerodrome. As in previous years a number of very interesting papers were read, among them being one on " The Position of Air Transport Today," by General Brancker, on airship services by Commander Burney, on progress of research by Air Vice-Marshal Sir Geoffrey Salmond, on the value of gliders by Col. Ogilvie, and on seaplanes by Mr. C. R. Fairey. On the third day of the Air Conference the papers read on the second day were discussed.

Towards the end of February the report of the Hambling Committee on the best method of subsidising air transport was published. This report recommended the formation of a single powerful company, which as a result of the suggestion that its capital should be one million sterling has become generally nicknamed the " Million Pound Monopoly Company." This company is in process of being formed at the present time, and will combine the four existing companies, with representatives of the Government and Air Ministry. Sir Eric Geddes is mentioned as chairman of the company.

During the first week in March the report by the Civil Aviation Advisory Board on London aerodrome facilities was issued, and recommended the retention of the Croydon aerodrome as the London Terminal Aerodrome. On March 8 the Air Estimates were presented to Parliament, and called for a net expenditure of £12,011,000, of which £1,913,400 was to be spent on the purchase of complete machines, £940,800 on complete engines, £395,400 on machine spares, and £370,300 on engine spares. It is to be feared that the amount of orders actually placed with aircraft and engine firms will fall considerably short of these figures, although it appears that just lately there has been a considerable fluttering in the Air Ministry dove-cotes lest too much of that money shall remain unspent and have to be returned to the Treasury. Towards the end of March the Royal Aero Club announced the offer by Lord Edward Grosvenor of a challenge cup and cash prize for aeroplanes with engines of not more than 150 h.p. On March 29 FLIGHT published the first description of a British light monoplane, the A.N.E.C., which later in the year did so well in the Lympne competitions.

Early in April an announcement was made which marked the beginning of a new line of development. We refer to the offer by the Duke of Sutherland of a prize of £500 for competition by machines with an engine capacity limited to 750 c.c. About the same time the " Wren " designed by Mr. Manning for the English Electric Co., made its first flights, and demonstrated the possibility of flying with an engine developing not more than 10 b.h.p. During the same week M. Barbot made his first flights on a Dewoitine light monoplane, so that actual practical flying with low-power aeroplanes may be said to have started simultaneously in France and England. Immediately following the offer by the Duke of Sutherland, the *Daily Mail* added another £1,000 for light 'planes, but open to the world. Also during the month of April a Bristol " Jupiter " engine made a series of runs totalling 150 hours, of which one was a nonstop run of 50 hours at 90 per cent. full power.

On one of the first days in May the Abdulla Company offered a prize of £500 for the greatest speed attained by a light 'plane, and thus the Lympne competitions were considerably widened in their scope, the previous two prizes having been offered for economy only. On May 6 M. Barbot made the double crossing of the Channel on his Dewoitine light monoplane, flying from St. Inglevert to Lympne, and, after a short rest at Lympne, back to St. Inglevert again. In the House of Lords on May 9 the Marquess of Salisbury stated that the provision of the 18 new R.A.F. squadrons provided for in the Air Estimates would be pushed on with all dispatch. About the middle of the month the Air Ministry announced the offer of a £50,000 prize for a helicopter to fulfil certain specified conditions. The Air Ministry has been criticised for making this offer, as experts outside Adastral House are almost unanimously of the opinion that the helicopter offers but small promise of greater efficiency than the aeroplane. However, the conditions are such that there is little chance of the prize being won, and if it should be won the machine capable of fulfilling the conditions will probably be worth the money. A splendid performance was put up during the month of May by the small Bristol " Cherub " engine of 1,086 c.c. capacity. It had originally been intended to make the usual five runs of 10 hours each, but the engine ran so well that it was decided to complete the 50 hours in one non-stop run, and this the engine successfully did.

Early in June it was announced that the Postmaster-General and the Secretary of State for Air had appointed a Committee to study the possibility of improving the air mails. The Committee consisted

of three members: Lieut.-Col. Moore-Brabazon, Major-General Sir Sefton Brancker, and Brigadier-General Williamson. On June 25 the first International Air Congress was opened. This congress consisted of approximately 450 delegates, representing seventeen nations. A very large number of technical papers was read, and many more were sent in which time did not allow of reading. The official report of the congress has just been published. The race for the Grosvenor Challenge Cup was flown on June 23, and was won by Flight-Lieut. Longton on a Sopwith "Gnu." The race was marred by the accident in which Major Foot, M.C., was killed.

On June 28 two American aviators remained in the air for 23 hours 48 mins., their fuel supply being replenished from another aeroplane while in flight.

The Fourth R.A.F. Aerial Pageant was held at Hendon on June 30, and as usual was well attended. The display of formation flying was up to the usual high R.A.F. standard, and some of the finest trick flying imaginable was seen.

The Circuit of Britain, for the Cup presented by H.M. The King, was flown on July 13 and 14, and was won by Mr. Courtney on a Siddeley "Siskin" with Siddeley "Jaguar" engine. On July 20 the Gothenburg International Aero Exhibition was opened. Great Britain was well represented at this show, and the competition for commercial aeroplanes was won by Mr. Alan Cobham on the new D.H. 50 with Siddeley "Puma" engine. Capt. Macmillan flying a Bristol Fighter with Bristol "Jupiter" engine was awarded 1,215 Swedish Kronor in the premium flying.

The eighth Aerial Derby was won, on August 6, by Mr. Larry Carter on a Gloucestershire Aircraft Co. "Gloster," with Napier "Lion" engine. His average speed over the 200 miles course was 192·4 m.p.h. On August 14 a trial flight was made with the new Supermarine "Sea Eagle" flying boat over the route Southampton–Cherbourg–Guernsey, preparatory to starting a regular service to the Channel Islands. One of the passengers was Sir Sefton Brancker. On August 27–28 two American aviators made a non-stop flight of 37 hours 15 minutes' duration, their machine being refuelled 15 times during that period.

In France the Grand Prix for commercial machines, which finished on September 24, was won by the Farman monoplane, a Farman Goliath biplane being second. On September 28 the Schneider Cup seaplane race was won at Cowes, Isle of Wight, by the American pilot Lieut. Rittenhouse, on a Curtiss-Navy seaplane with 465 h.p. Curtiss D–12 engine, at an average speed of 177·38 m.p.h. Rittenhouse's fastest lap was covered at a speed of 181·17 m.p.h. During the last week in September the French rigid airship "Dixmude" made a record voyage, lasting 118 hours 41 mins. Leaving Cuers-Pierrefeu she visited Marseilles, the Balearic Islands, Algiers, Bizerta, Susa, Sfax, Tougourt, and returned to Cuers-Pierrefeu. Having still plenty of fuel left, she proceeded to Bordeaux, Paris, and Moulins, finally returning to her base at Cuers. The distance covered was about 4,400 miles.

The light 'plane competitions at Lympne, for prizes presented by the Duke of Sutherland, the *Daily Mail*, the Abdulla Company, and others, commenced on October 8 and lasted till October 13. The meeting amply demonstrated the capabilities of aeroplanes fitted with low-power engines, an enormous amount of flying being done during the week in spite of very bad weather. The English Electric Co.'s "Wren," piloted by Flight-Lieut. Longton tied with the A.N.E.C. monoplane, piloted by James and Piercey, for the Sutherland and *Daily Mail* prizes. Both machines covered a distance of 87·5 miles on a gallon of petrol. The speed competition for the Abdulla prize was won by Capt. Norman Macmillan on a Parnall "Pixie," whose average speed over two laps of the course was 76·1 m.p.h. The A.N.E.C. monoplane was second with a speed of 74 m.p.h. The altitude competition was won by Piercey on an A.N.E.C. monoplane, who reached a height of 14,400 ft. Capt. Hamersley, on an Avro biplane, was second with a height of 13,850 ft. The greatest distance flown by a machine during the week was accomplished by an Avro monoplane, piloted by Mr. Bert Hinkler, who covered no less than 80 laps of the course, or a total distance of 1,000 miles. An A.N.E.C. monoplane was second with 62 laps. Unfortunately the meeting was marred by the fatal accident to M. Maneyrol, who, on returning from an altitude flight, was killed through his machine breaking its wings at an altitude of about 100 ft. The body of the unfortunate pilot was later conveyed to France by aeroplane. On October 27 a race meeting for light 'planes was held at Hendon, where in spite of a very strong and bumpy wind a number of the Lympne machines competed and demonstrated that they are far from being the fair-weather craft that many had imagined.

In America history was being made in the meantime. A great aviation meeting was held on October 4, 5, and 6. On the last day the race for the Pulitzer trophy was flown, and was won by Ensign Williams on a Curtiss Racer with Curtiss C.D.12 engine of 500 h.p. at an average speed of 243·67 m.p.h.

During the meeting St. Louis was visited by the American rigid airship "Shenandoah," which made the journey from its base at Lakehurst, New Jersey, covering a distance of 2,200 miles and remaining in the air for 48 hours.

During the third week in October two very important statements were made by the Secretary of State for Air, Sir Samuel Hoare. One, at the Colchester Division Conservative Association, was on the subject of the reconstruction of the Royal Air Force, and the other, at a meeting of the Imperial Economic Conference, dealt with Empire air communications.

A visit to the London Terminal Aerodrome, Croydon, was paid by Prime Ministers and other representatives of the Dominions and India on November 10. The arrangements were in the hands of the R.A.F., and a fly-past of the latest types of machines took place, the types ranging from the large 1,000 h.p. Napier-engined Avro "Aldershot" to the 10 h.p. "Wren" light monoplane. The question of popularising light 'plane flying by encouraging amateur construction having arisen, FLIGHT enquired of the various aircraft manufacturers their views on the subject, and they unanimously decided against amateur construction, holding that sufficient supervision could not be maintained to ensure that the high quality of workmanship necessary for safety would be attained.

Towards the end of November it was announced that the American Goodyear Company had acquired all patent and building rights for the United States of the Zeppelin Company of Friedrichshafen.

On November 26 the Belgian Poncelet light monoplane "Vivette" made several flights carrying pilot and one passenger, although the engine was of less than 800 c.c. capacity.

A new world's speed record was established on November 4, when Ensign Williams, winner of the Pulitzer race, covered the new 3 kilometre speed course at an average speed of 429 kms. (226·2 m.p.h.). This record has been homologated. The machine was the Pulitzer race Curtiss.

On December 8 Mr. Alan Cobham, flying a D.H. 53 light monoplane, flew from London to Brussels in 4 hours 5 minutes. December 17 was the twentieth anniversary of the first flight in a power-driven aeroplane, Mr. Orville Wright succeeding on December 17, 1903, in making four short flights.

A very regrettable accident occurred on December 13, when Mr. Lawrence Sperry, who had set out from Lympne on his "Messenger" biplane to fly to Amsterdam, came down in the Channel off Hastings. Eye-witnesses stated that the engine was running badly, but when the machine was salvaged it appeared to be practically undamaged. Of Mr. Sperry no trace has been found, his fate remaining a mystery.

AIRCRAFT *v.* BATTLESHIP

Admiral Mark Kerr and Viscount Curzon State their Views

A VERY interesting, although to our way of thinking not altogether conclusive, debate on the battleship policy took place at the Royal United Service Institute, Whitehall, on December 14, Lord Ampthill being in the Chair. The "challenger" in the debate was Admiral Mark Kerr, who put forward the following proposition: "That in order to preserve the command of the sea it is necessary to adapt our warships and aircraft to modern requirements, since the present type of battleship no longer performed that function; the reorganisation of the naval bases thus becoming requisite."

Admiral Kerr first pointed out that in an Empire like ours communications were as vital to us in peace as in war. The British Navy existed for the sole purpose of maintaining our communications and stopping those of the enemy in times of war. It could never win a war, but no war could be won without it. Throughout our history the lines of sea routes had been kept open for our merchant ships by cruisers of varying types, whilst enemy Mercantile Marine had been captured or debarred from them by the same means.

In order that these light, fast craft could perform their function properly, the battleship was produced to hold the ring and prevent interference from the enemy. This, he declared, was no longer possible, for the mine, the submarine, and aircraft had radically altered the conditions. Admiral Kerr said this was a very important point, because it did away with the principal function of the battle fleet to hold the ring so that the cruisers could work in safety. The problem before them came under two principal headings: (1) What type of ship should the present battleship be so that it can hold the ring under modern conditions? (2) How are we to command the sea communications between our Empire and other parts of the world in the face of present-day circumstances

From the earliest times man had striven for three things in order to win in the struggle against the animals and other men. They were range, speed, and invisibility. The last word in speed was spoken by the air, whose craft could travel on unfixed routes at over 200 m.p.h. For invisibility man used smoke screens on land and sea, submarines, and aircraft.

Admiral Kerr went on to say that he had observed the effect of the flotillas of the air on the flotillas of the submarine, and from the returns received it was shown that never was a vessel sunk which was escorted by heavier-than-air craft, and he thought there was only one case of a sinking when escorted by a lighter-than-air vessel. The submarine loathed and detested the aircraft. It was the only enemy that could strike it without itself being hit.

He agreed that there will always be battleships, but their size, type, and armament will change.

"A battleship," he said, "may be a submersible of 5,000 tons or an aeroplane-carrying ship of 15,000 tons, or some other kind not yet thought of, of 50,000 tons or 5 tons, but it certainly is not the present type, if it is to be of any use. Let us find out what we really want before spending money in feverish haste on what is of use no longer."

He believed the present form of battleship should be an aeroplane-carrying ship, with aircraft carrying 21-in.torpedoes, others with depth-charge bombs and smoke bombs, and with some fighting machines as well. There would be in attendance on this vessel submarine destroyers when necessary, according to the work and position of the ship. A secondary armament of 6-in. guns would be provided for defence against submarine destroyers, and the vessel should be fitted with blisters and well sub-divided.

Admiral Mark Kerr also advocated a Minister of Defence for the fighting services, and criticised the spending of so large a sum of money on the Singapore Base.

Replying for the other side, Viscount Curzon said that Admiral Kerr's case depended entirely on whether the capital ship could be destroyed by the submarine or by aircraft. Unless they could prove that the modern type of battleship was unable to withstand a reasonable amount of attack from these sources, there was every reason for continuing to build such vessels. The existence of the capital ship had been threatened from time to time by various new inventions, such as the torpedo, the mine, and aircraft. The advocates of these devices had prophesied the end of the capital ship, but it had been developed so as to meet their threats with success.

Mines, submarines, and aircraft had added to the difficulties of defence, but he contended that torpedoes and bombs were not weapons of precision as were shells from guns. Most of the damage in the Battle of Jutland came from gunfire, whilst the mine had been combated by the paravane. He did not think the bombing experiments were any guide as to the results which would have been obtained against modern ships under actual war conditions. He did not deny they were a menace, but before he accepted Admiral Kerr's view he wanted to know the exact proportions of the menace. If the present progress in anti-submarine warfare was maintained, he thought the submarine would be rendered powerless. As to the aeroplane-carrier battleship, if the present type was obsolete the other suggested type of vessel would be more vulnerable and less efficient.

The conclusion he reached, therefore, was that the present type of capital ship remained today, as it had always been, the unit on which all other naval forces must depend for support, and which, when the critical hour of the fleet action took place, became at once the dominating factor.

Vice-Admiral Bernard, Captain Altham, Commander Boothby, and Rear-Admiral Boyd also took part in the discussion, and in summing up the debate the Chairman said that he must rule that the challenger had failed to make out his case against the present type of battleship, or in regard to the Singapore base.

Manchester–Belfast Air Mail

COLONEL SHELMERDINE, of the C.A. Department of the Air Ministry, arrived in Belfast on December 14 by aeroplane from Manchester to inspect the ground at Musgrave Park, Balmoral, which the Corporation propose should be provided for the purposes of a terminal point of the suggested air mail service between Belfast and Manchester.

Paris–South America Air Line

FROM Paris it is reported that Government support will be given to a scheme for an air line from Paris *via* Bordeaux, Lisbon, Casablanca, Dakar, and across the Atlantic to Pernambuco. At first the air line will only extend as far as Dakar, mails and goods being conveyed across to Pernambuco by steamer.

FLIGHT

TWO RECENT AMERICAN COMMERCIAL 'PLANES

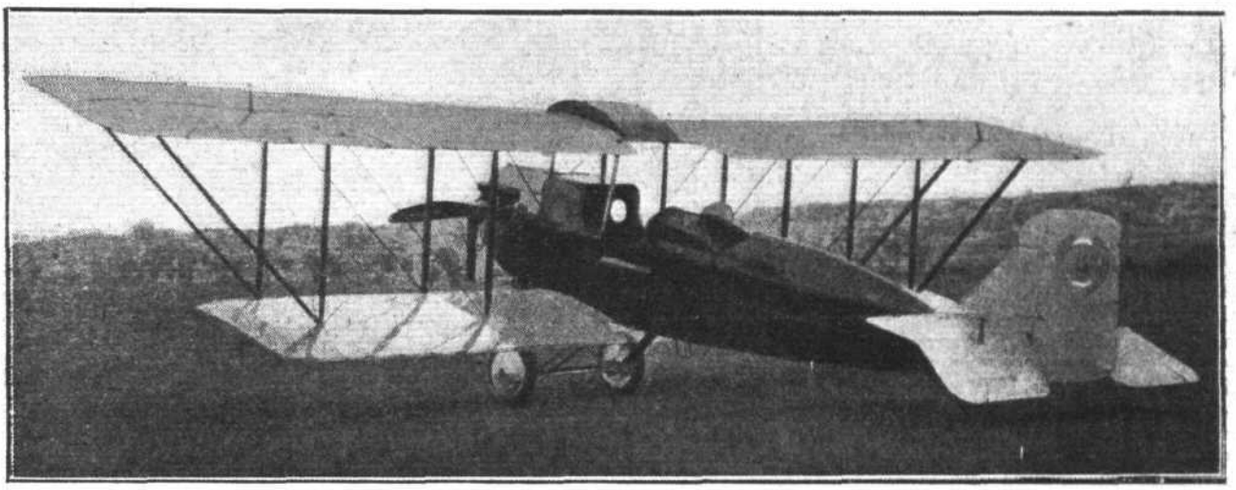
The Lincoln-Standard L.S.5 and the Laird Limousine

THE Lincoln-Standard L.S.5 was designed by O. W. Timm, chief engineer of the Lincoln-Standard Aircraft Corporation, of Lincoln, Neb., to meet the demand for a practical five-seater commercial passenger-carrying aeroplane. Tests with the first model proved to be very successful, and the machine was put into production. Safety and comfort for the passengers were the first considerations. Among the other principal points that were carefully considered are, the safety factor, durability, economy of operation, repair and replacement of parts, and minimum of work in up-keep, etc.

As regards the construction of the machine, the fuselage is of orthodox rectangular cross-section, the maximum depth being 4 ft. 4 ins. and the maximum width 2 ft. 9 ins. The passenger compartment is 4 ft. 9 ins. in length, and is richly upholstered with maroon-coloured leather. Accommodation is provided for four passengers with comfort, two being seated facing forward and two seated opposite looking aft. The passengers are protected from the wind by the partially enclosed portion of the cockpit. This enclosed portion, resembling the " cab " of a locomotive, is constructed of plywood, and is provided with circular windows. Three steps on the outside of the fuselage give access to the passengers' cockpit.

The longerons are of ash, braced with $\frac{3}{32}$-in. three-ply Haskelite walls and plywood bulkheads from the nose to the pilot's cockpit, which is located immediately behind the passengers' compartment. Aft of the pilot's cockpit the fuselage is of the usual girder construction, fabric covered. The interior wood parts are covered with several coats of Valspar varnish, the exterior is finished in dark maroon, Valspared, while the motor compartment is painted with a grey fire-resisting paint. The engine is enclosed by a motor-car type " bonnet " of polished aluminium, hinged at the top and sides, and held in place by six spring fasteners.

The wings are constructed in conventional truss form, the top plane being of larger span than the lower. The overhang is braced with steel tubing, streamlined with Balsa wood.

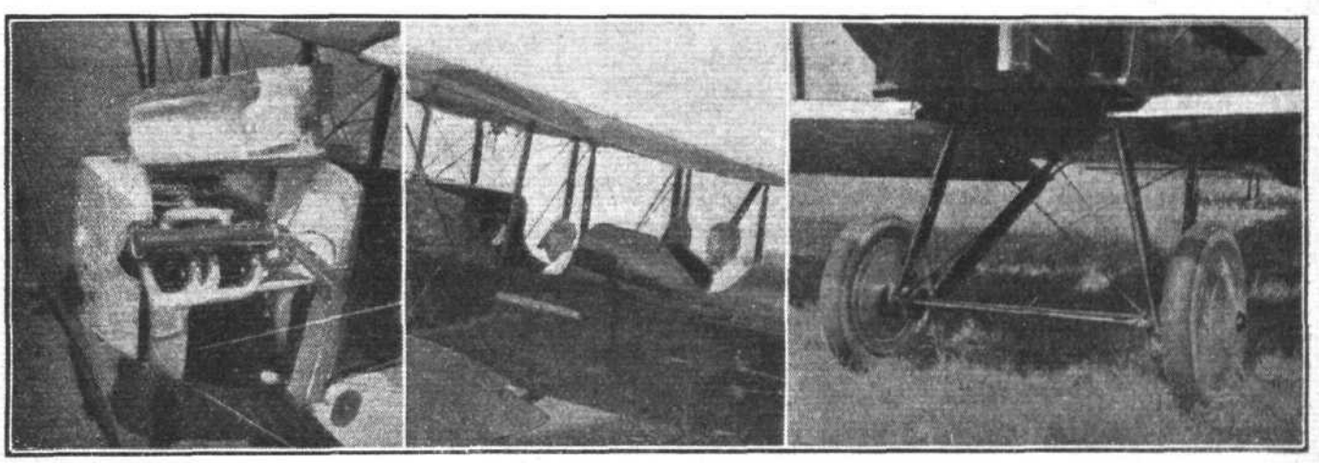


THE LINCOLN-STANDARD L.S.5 COMMERCIAL AEROPLANE : Three-quarter rear view of the complete machine, showing the semi-enclosed cabin, seating four passengers.

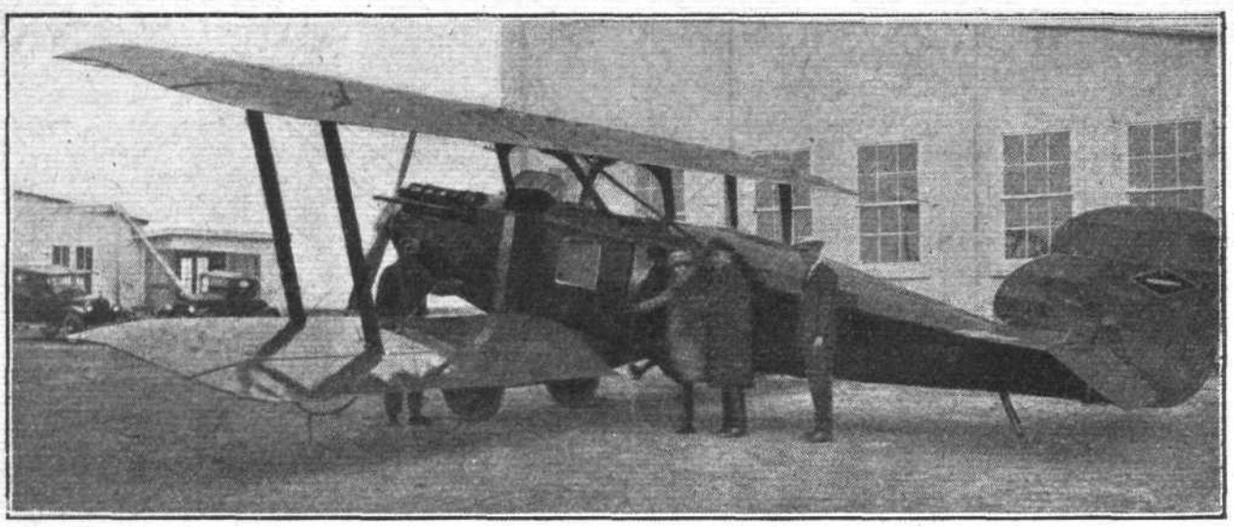
The top plane is in two main panels and one centre section, and the lower plane is in two panels. In the centre section, which is built up of two main spars and plywood, is the 42-gallon petrol tank, provided with a positive sight gauge. The wing spars are of spruce, routed to I-beam section, and the ribs are of the web type. Ailerons are fitted to the top plane only, being hinged to the rear spar. Wing fittings are of plate form. The interplane struts are attached to universal sockets and secured with pins. The wings are covered with a long fibre cotton fabric, and doped with four coats of acetate and two coats of nitrate dope pigmented with aluminium.

The horizontal stabiliser is of the non-lifting type, and is constructed of wood braced with cable. The elevators are of wood, built up on a continuous steel tube, whilst the rudder, which is balanced, is constructed with a steel tube main spar and trailing edge, and wood ribs.

A conventional V-type landing gear is fitted, being attached to the fuselage with hinge-fittings. The struts are of steel tubing, streamlined with Balsa wood. Two 30-in. by 5-in. wheels run on a nickel-steel tubular axle, $2\frac{1}{4}$ ins. in diameter. The axle is not provided with guides, but the action is limited



THE LINCOLN-STANDARD L.S.5 COMMERCIAL AEROPLANE : Three close-up views : on the left, the 180 h.p. Hispano-Suiza engine in situ ; centre, the passengers' and pilot's cockpits ; right, the landing gear.



THE LAIRD LIMOUSINE : Three-quarter rear view of the complete machine. It has a totally enclosed cabin seating five passengers, and is fitted with a 300 h.p. 12-cylinder Packard engine.

by the ½-in. elastic absorber cord wrapped on the spools, and a safety cable is also fitted. The wheels are streamlined with aluminium covers. The tail skid is mounted on a swivel post and secured with ⅜-in. elastic absorber cord. This skid is of hickory and is provided with a spring steel shoe.

The engine fitted in the Lincoln-Standard L.S.5 is the famous eight-cylinder Hispano-Suiza, developing 180 h.p. at 1,750 r.p.m. The cooling system consists of two side radiators, with an expansion tank mounted between the cylinder blocks. The oil tank is located at the back of the engine. All the water, petrol, and oil lines are fitted with flexible couplings. The exhaust is carried down at the nose of the fuselage, thereby keeping the exhaust fumes clear of the cockpit and lessening the noise of the exhaust. A booster magneto is provided for starting the engine.

The principal characteristics of this machine are as follows :—

Span, top	44 ft. 7 ins.
Span, bottom	30 ft. 0 ins.
Chord	6 ft. 0 ins.
Gap	6 ft. 0 ins.
Dihedral angle	1°.
Sweepback	5°.
Stagger	5½ ins.
Overall height	10 ft. 7 ins.
Wing section	R.A.F.3
Area of top plane (incl. ailerons)	267 sq. ft.
Area of bottom plane	180 sq. ft.
Total wing area	447 sq. ft.
Area of ailerons (two)	42 sq. ft.
Area of stabiliser	23·7 sq. ft.
Area of elevators	22·8 sq. ft.
Area of rudder	12 sq. ft.
Area of fin	4·6 sq. ft.
Weight, empty	1,735 lbs.
Weight, fully laden	2,922 lbs.
Pay load	720 lbs.
Loading per h.p.	16·2 lbs.
Loading per sq. ft.	6·5 lbs.
Speed range	34-93 m.p.h.
Climb in 10 minutes	5,200 ft.
Ceiling	18,000 ft.
Fuel capacity : petrol	42 gals.
Fuel capacity : oil	5 gals.
Radius of action	310 miles.

In the second machine under review, built by the E. M. Laird Company, of Wichita, Kansas, is a handsome limousine, or enclosed cabin type tractor biplane, also designed for commercial purposes. The cabin is luxuriously upholstered in grey plush and seats five passengers comfortably, two in the fore part of the cabin and three at the rear. All the seats face forward ; the two front ones are separate, there being sufficient space between each seat to allow easy access to them. Opposite each seat is a window giving good, all-round vision.

Aft of the cabin is a compartment of sufficient size to carry 30 lbs. of luggage for each passenger. Access to the cabin is by a door on the port side, and the step of the door is low enough to enable the passengers to get in or out without the aid of a platform. The pilot's cockpit is located immediately in front of the cabin, and communication between pilot and passengers may be carried on through a door provided for this purpose. The pilot's cockpit is large enough to seat two people side by side, and dual Dep. control is fitted.

The wings are of conventional design, the spars being built up of laminated spruce, box type, and the ribs of reinforced plywood, truss type. They are of the two-bay type, with a single pair of interplane struts each side. Ailerons are fitted to both upper and lower planes. The tail surfaces are of ample proportions.

The fuselage is of the usual rectangular section girder construction, the cabin portion being covered with three-ply veneer. A 300 h.p. Packard 12-cylinder engine is fitted, being mounted in a specially designed steel tube mounting. Both the mounting and the engine may be removed from the fuselage in one unit by unscrewing four bolts—or the engine may be removed from the mounting in the usual way.

The overall span of the Laird limousine is 38 ft., the length 28 ft. 6 ins., and the height 10 ft. It carries a useful load of 1,800 lbs., and has a speed range of 45-95 m.p.h. The cruising radius is 300 miles.

A German Air Combine

FOLLOWING on the Trans-Europe Union combine, formed a little while back by the Junkers Company, with headquarters at Zurich, comes the report of another big combine of air companies organised by Junkers. This is to be known as the North-East Europe Union, and will comprise the following companies : Junkers (German and Russian branches), Esthonian Air Transport Company (" Aeronaut "), Finnish Air Transport Company (" Aero "), Lettish Air Transport Company, and a Swedish company, name at present unknown.

A Norwegian Air Mail Service

PLANS are being made, by two Norwegian pilots, for a daily air mail service between Christiania and Copenhagen, starting next spring. Arrangements have been made with the Junkers Company for the supply of three Junkers seaplanes (185 h.p.), which will be " loaned " on the understanding that the Junkers Company are to have a voice in the technical management of the concern. The pilots will be Norwegian, and will be trained at the Junkers works. The route will be *via* Gothenburg, where a 15-minute stop will be made, and the municipal authorities have promised a minimum guarantee of 10,000 kroner on condition that accommodation is reserved for one passenger each way between Christiania and Gothenburg. The Norwegian postal authorities are favourably disposed towards the scheme, and an application has been made to the Norwegian Government for a subsidy of 75,000 kroner.

LIGHT 'PLANE AND GLIDER NOTES

Those wishing to get in touch with others interested in matters relating to gliding and the construction of gliders are invited to write to the Editor of FLIGHT, *who will be pleased to publish such communications on this page, in order to bring together those who would like to co-operate, either in forming gliding clubs or in private collaboration.*

LIEUT. THORET, who is at present in Czecho-Slovakia demonstrating a Dewoitine light monoplane, made a flight over the Little Carpathian Mountains on November 30. Starting from the Vanihory aerodrome, near Bratislava, he flew along the tops of the mountains, looking for country suitable for gliding. On his return he found what was considered a favourable locality, near Bystrica, at the confluence of the Danube and Morava. During part of the time Thoret was flying along the sides and top of the ranges his engine was missing on one cylinder, but he got back safely and landed at Bystrica.

* * *

THE Bystrica district has also been reconnoitred from the air by Thoret, who was accompanied by a Czecho-Slovak pilot, in a two-seater military aeroplane. On several occasions it was found possible to throttle down the engine and glide in the up-currents. It is expected that Lieut. Thoret will now try the air in the district with his Dewoitine gliders, of which he has with him two examples, and it is hoped that conditions will prove so favourable that performances equaling, or even exceeding, those put up in the Rhön may be obtained.

* * *

OWING to the fact that FLIGHT has had to go to press several days earlier than usual this week, on account of the Christmas holidays, it is impossible to include in this week's issue any reference to Cobham's return flight from Brussels on the De Havilland 53 light monoplane, with Blackburne engine, on which he flew from London to Brussels a short time ago in just over 4 hours. At the time of writing these notes it was just learnt that Cobham had had his machine transported from the Brussels show to the Haren aerodrome, where he was to give some exhibitions of stunt flying preparatory to his return to England. It might be mentioned, although it really goes without saying, that Cobham is lubricating his Blackburn with "Castrol."

* * *

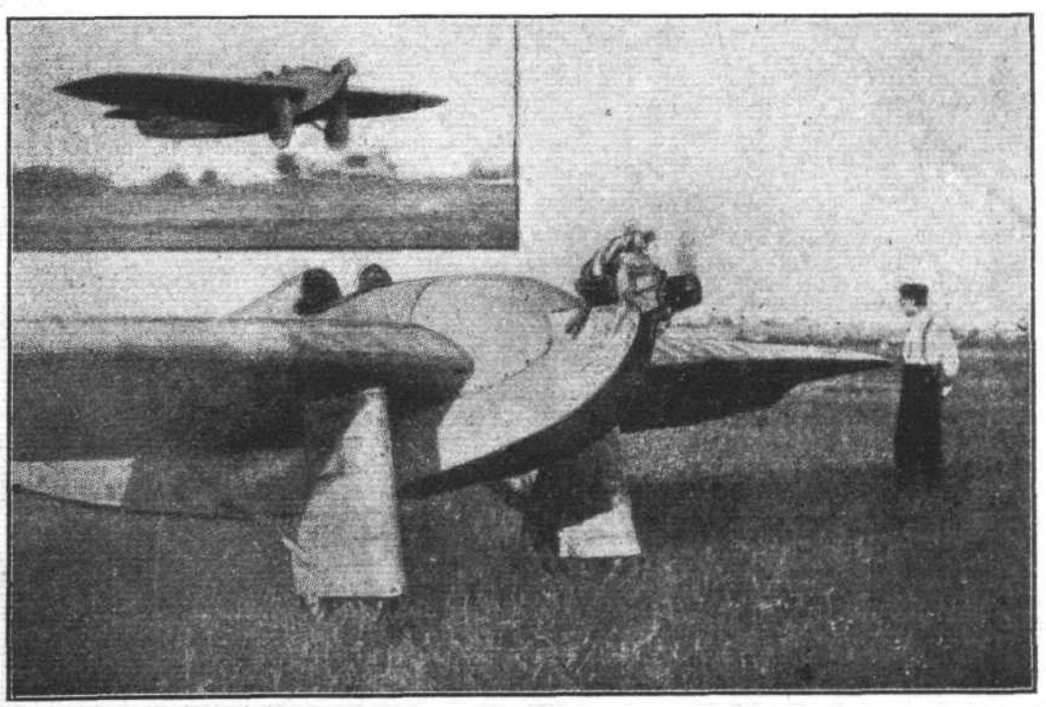
THE Carley (Dutch) light monoplane described in our issue of November 29, 1923, is about to be flown over the route Rotterdam-Brussels-Paris-London-Rotterdam. On December 18 the machine, piloted by Raparlier, left Rotterdam at 11.20 a.m., and arrived in Brussels at 12.05. After a stay of about 1¾ hour at Brussels, Raparlier left *en route* for Paris. He met with a strong head wind, which slowed down his progress considerably, and just as he was within sight of Le Bourget aerodrome he ran out of petrol and had to land outside the aerodrome. After obtaining some fuel, he proceeded, and actually landed at Le Bourget at 4.35 p.m., having taken, including the stop, 3 hours 18 mins. for the flight from Brussels to Le Bourget. There he will give exhibition flights before various French and foreign representatives, and will then proceed to London, where it is hoped many of FLIGHT's readers will take the opportunity of inspecting the machine. The engine fitted is a 20 h.p. Anzani.

THE PEGNA "RONDINE" LIGHT MONOPLANE

400 c.c. A.B.C. Engine

GRADUALLY the light 'plane movement is spreading. Originally the ball was started roiling by French constructors. Then England took up the subject, and showed by the excellence of the machines gathered at Lympne last October that in this class, as well as in the more "serious" types, British constructors can more than hold their own. In Belgium and Holland light 'planes are beginning to appear, some of which have put up very good performances. In Germany little has been done, although two or three light 'planes have been built. America is just beginning to be interested, although it should be pointed out that individual experimenters have, from time to time, produced low-power machines, without, however, the movement really spreading to wider circles. Now Italy has made a start, and, by the courtesy of our Italian contemporary *Notiziario di Aeronautica*, we are able this week to publish general arrangement drawings and photographs of the first Italian light 'plane, the Pegna "Rondine" (Swallow).

The "Rondine" was designed by Signor Giovanni Pegna, and built by Piaggio and Co., of Rome. In certain respects, it will be seen, the machine is not unlike the Klemperer Aachen monoplane glider, with its "trousered" undercarriage and fairly low wing position. The aspect ratio of the thick cantilever wing is, however, fairly low, and as the machine is designed for low speeds and high power loading it may be questioned whether the efficiency is all that it might be. It is stated that the best L/D ratio is 14, which is probably approximately correct, as the parasite resistance does not



The Pegna "Rondine." Photograph shows undercarriage and engine mounting. Inset, the machine in flight.

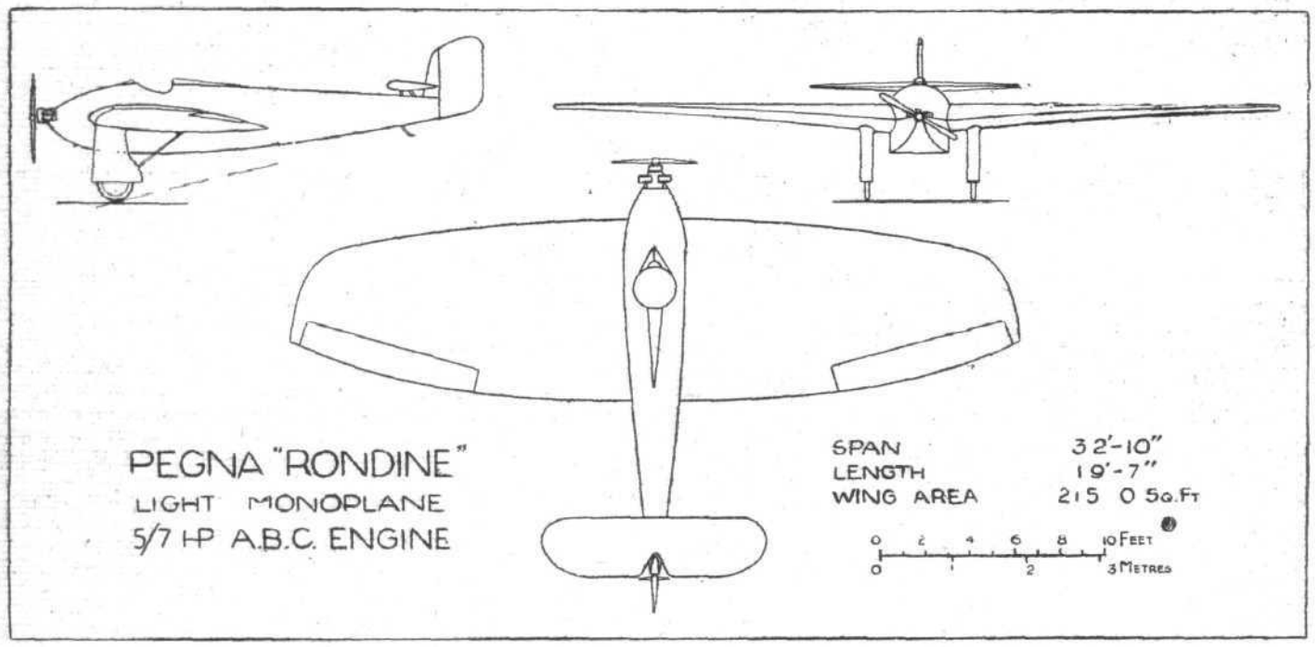
appear to be very great. We understand that several engines were tried, but not found satisfactory, and that ultimately a 400 c.c. A.B.C. flat twin, similar to those fitted on the English Electric Company's "Wren," was tried, and found to fly the machine quite well. In this connection it is interesting to compare the "Wren" and the "Rondine." The former weighs, fully loaded, 420 lbs., and has a wing area of 150 sq.ft., giving a wing loading of 2·8 lbs./sq. ft. The "Rondine" weighs, fully loaded, 464 lbs., and has a wing area of 215 sq. ft., giving a wing loading of 2·16 sq. ft. Assuming that the engines develop the same power (10 h.p.), the power loadings become 42 and 46·4 lbs./h.p. respectively. It is, however, stated that the A.B.C. fitted in the "Rondine" develops a maximum of 5·7 h.p. at 3,450 r.p.m., in which case the power loading of the "Rondine" is 81·5 lbs./h.p. (maximum).

As regards minimum power required for straight flight, the "Wren" will probably fly with the engine developing 3 b.h.p.—*i.e.*, on just over 2 propeller h.p. It is stated that the "Rondine" will just fly level, at 100 metres (330 ft.), with the engine running at 2,400 r.p.m. and developing about 3 h.p. Thus the two machines should require approximately the same power, the higher power loading of the "Rondine" being apparently offset by the slightly lighter wing loading. On the other hand, the monoplane wing of the "Wren" is of much higher aspect ratio, while there is no projecting undercarriage, so that one would expect the overall L/D of this

The fuselage is of even more unusual form, and consists in effect of two separate sections, of which the lower is a load-carrying trough covered with three-ply, while the upper and deeper portion is merely a very deep fairing, consisting of very thin but closely-spaced stringers supported on light formers. As far as can be gathered, the wing is placed in position before the forward portion of the fuselage is built on, so that, apparently, there is no means of removing the wing from the fuselage once the latter has been finished and covered.

The undercarriage is of the two-wheel type, with each wheel supported by, and partly enclosed in, a streamlined structure, very much like the "trousers" of the Aachen glider. The track is fairly wide, as the undercarriage struts are attached to the wing a considerable distance out from the fuselage. The wide track is probably necessary, as the wing tips are a considerable distance above the ground, and there might thus otherwise be some risk of the machine turning over.

The engine, as already stated, is an A.B.C. flat-twin air-cooled of 400 c.c. capacity. A three-to-one reduction gear is employed, and as far as can be ascertained, this is in the form of a simple spur gear, enclosed in an aluminium casing in front of the engine. Thus, with the engine running at maximum revolutions of 3,450 r.p.m., the propeller is only doing 1,150 r.p.m., while when throttled down to minimum power required the propeller is only doing 800 r.p.m.



machine to be considerably the better of the two. Certainly the figure is better than the 14 given for the Italian machine. It might be pointed out, however, that the "Rondine" has a three-to-one reduction gear to the propeller, so that the propeller efficiency may be somewhat higher. By the time one takes into consideration all these various factors it seems reasonable to suppose that in performance there should be little difference, and this appears to be borne out by the figures given.

Constructionally the "Rondine" is somewhat unusual, not only in certain peculiar features in the wing structure, but even more so in the fuselage. The monoplane wing, which is in one piece, has two main spars of spruce, with lattice ribs. From a point on the front spar in the vicinity of the undercarriage strut attachment, stringers radiate out and back to meet the rear spar at a series of points between the tip and the root. These stringers are double—that is to say, one of a pair runs from the top of the spar and one from the bottom. They appear to pass underneath the rib flanges, to which, apparently, they are bound or taped. As far as can be gathered from photographs, there is no internal drag bracing in the wing, and presumably, therefore, the stringers are intended to form the drag bracing. If this is the case it will be seen that the rear spar only is braced against drag loads, the front spar receiving its support against these loads from the ribs. To us this form of bracing does not seem particularly suitable. It can scarcely be as strong as the more usual forms, and must weigh very nearly as much.

The pilot's cockpit is approximately in the centre of the wing chord, so that the view is probably somewhat restricted, although the fact that the wing is placed fairly low helps matters somewhat. The controls are of usual type, with joy-stick and foot bar.

The main characteristics of the Pegna "Rondine" are as follows: Length, o.a., 6 m. (19 ft. 7 ins.); wing span, 10 m. (32 ft. 10 ins.); mean chord, 2 m. (6 ft. 7 ins.); mean aspect ratio, 5; wing area, 20 sq. m. (215 sq. ft.); weight of machine empty and without engine, etc., 90 kgs. (198 lbs.); engine, reduction gear and propeller, 35 kgs. (77 lbs.); instruments, etc., 6 kgs. (13·4 lbs.); pilot, 65 kgs. (143 lbs.); petrol and oil, 15 kgs. (33 lbs.); total loaded weight, 211 kgs. (464 lbs.). The maximum speed is given as 70 kms. (43 m.p.h.), and the landing speed as 40 kms. (25 m.p.h.).

It is understood that as a result of the experience with the "Rondine" two more machines will be built, which will, however, be slightly different from the experimental machine. For one thing, they will have divided wings, so that the objection to building the wing permanently into the fuselage will then be overcome. One of these machines will, we understand, be a single-seater and the other a two-seater. They will be fitted with larger engines—15 h.p. and 20 h.p. respectively, and the engines themselves will be built by Piaggio. It is expected that both types will be ready early in the new year. The "Rondine" has made something like 100 flights, and has, it is stated, been found to handle well, being both stable and manœuvrable.

FLIGHT

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

COMMITTEE MEETING

A MEETING of the Committee was held on Wednesday, December 12, 1923, at 5 o'clock, when there were present: Lieut.-Col. F. K. McClean, A.F.C., in the Chair, Group-Capt. F. W. Bowhill, C.M.G., D.S.O., R.A.F., Major-General Sir W. S. Brancker, K.C.B., Mr. Ernest C. Bucknall, Lieut.-Col. John D. Dunville, C.B.E., Capt. D. G. Murray, Lieut.-Col. A. Ogilvie, C.B.E., Mr. F. Handley Page, Rear-Admiral Sir Godfrey M. Paine, K.C.B., M.V.O., Mr. T. O. M. Sopwith, and the Secretary.

Election of Members.—The following New Members were elected:—

Major Vernon A. Bradshaw.
Squadron-Leader J. W. Cruikshank.
A. G. B. Ellis.
Pilot Officer F. F. W. Hall.
John Laycock.
G. G. Parnall.
Flying Officer F. J. C. Rybot.
Flight-Lieut. T. F. W. Thompson.

Re-election of Members under Rule 41.—The Members of the Club elected during the year 1923 were re-elected in accordance with Rule 41.

Award of the Royal Aero Club Gold Medal to Lieut.-Col. F. K. McClean, A.F.C.—It was resolved that Lieut.-Col. Frank K. McClean be awarded the Gold Medal of the Royal Aero Club, in appreciation of his pioneer work in the advancement of aviation.

The resolution was proposed by Group-Capt. F. W. Bowhill, seconded by General Sir W. S. Brancker, and carried with acclamation.

Sub-Committees.—The Reports of the House and Finance Committees were received and adopted.

Royal Air Force Reserve.—It was decided to admit Officers in the Royal Air Force Reserve to Membership of the Club at an Annual Subscription of £2 2*s*., without entrance fee, whilst so serving.

RACING COMMITTEE

Light Aeroplane Competition, 1924.—General Sir W. S. Brancker reported on the present position regarding the Light Aeroplane Competition, 1924. The Air Ministry had not agreed to the exclusion of dual control, and the matter was to be further considered by the Racing Committee and the Society of British Aircraft Constructors at a joint meeting to be held on the 17th inst.

F.A.I. Paris Conference.—Lieut.-Col. M. O'Gorman and the Secretary were appointed to represent the Club at the Paris Conference, to be held on January 2, 3 and 4, 1924.

General Sir W. S. Brancker and Lieut.-Col. M. O'Gorman were appointed to represent the Club at the 25th Anniversary Banquet of the Aero Club de France, to be held in Paris on January 7, 1924.

Private Pilots' "A" Licences.—The requirements proposed by the Air Ministry for the issue and renewal of "A" Licences were considered.

In addition to the medical examination, applicants will be required to produce evidence of recent flying experience.

The matter was referred to the Racing Committee.

Record.—The following Record was granted: Hydro-aeroplanes (Class C^a).

Speed over 200 *kilometres* (Great Britain).—Lieut. David Rittenhouse, U.S.N. *Place*: Cowes, Isle of Wight. *Date*: September 28, 1923. *Machine*: Curtiss Navy Racer C.R.3. *Engine*: 465 h.p. Curtiss D.12. *Time*: 43 mins. 53·4 secs. *Speed*: 273·411 kilometres per hour.

Offices: **THE ROYAL AERO CLUB,**
3, CLIFFORD STREET, LONDON, W. 1.
H. E. PERRIN, Secretary.

AIR STRATEGY

By WING COMMANDER EDMONDS

ON Wednesday afternoon, December 12, Wing Commander Edmonds, by arrangement with the Royal Aeronautical Society, read a paper before the Royal United Service Institution on the subject of "Air Strategy," Lord Gorell occupying the Chair.

Wing Commander Edmonds reviewed the strategical problems of the Empire as seen from the seat of an aeroplane, explaining what the air strategist has to consider. He pointed out how a demonstration of air power often prevented small tribal wars. When, for instance, a tribe had repudiated our authority, more often than not a flight over the tribe's headquarters would bring the leaders to reason. The bombing might not cause many casualties, but the normal life of the tribe would be completely upset and their moral shattered, causing them readily to agree to terms of peace.

A big war between two highly civilised or industrialised countries was quite another matter. Here the Air Force would detail machines to attack arsenals, mobilisation, transportation centres and railway systems, thereby delaying the movements of the enemy armies and generally destroying his moral, besides bringing the business of the country to a standstill.

He did not say that all wars could be won the way he had indicated. The Air Force had the advantage of being able to move in three dimensions, and he held that an air attack on massed forces of the enemy was in some measure equivalent to a flank attack. The advantage of trying to win a war primarily by air action was that they were able to do away with long lines of communications, which were exceedingly uneconomical, especially in personnel. In future wars this waste would be greatly accentuated, and the question of protection would raise greater difficulties. He did not profess to be able to solve these difficulties, but he suggested an alternative, which was to use the Air Force, which needed no lines of communication. The Air Force was a difficult thing to attack—sunken ships of the Navy could not be easily and quickly replaced, but aeroplanes could be readily found to make good any wastage.

There was no one thing as a strategic defensive in air warfare, and it was impracticable to provide aeroplanes with an impregnable defence. To get superiority in the air, the enemy Air Force must be placed out of action, and in order that the Navy might have superiority on the sea the Air Force must get superiority in the air. As regards home defence, Wing Commander Edmonds said that there should be patrols employed on the coast, who would guard us against surprise, which would be more economical than having fixed defences along the coast.

Speaking at the conclusion of the paper, Vice-Admiral Bernard said he thought we ought to maintain an efficient secret service, for if we had at any time to fight for our lives the existence of a secret service would be of great value.

Lord Gorell, the Chairman, said the Air Force was very young and enthusiastic, and it had not been its fault that since the War it had been put on its defence. They had heard that the best method of defence was offence. It seemed to be fairly certain that in any future war instead of the raids being at long intervals, during which the dislocation caused could be repaired, they would be more frequent, and sometimes might be almost continuous.

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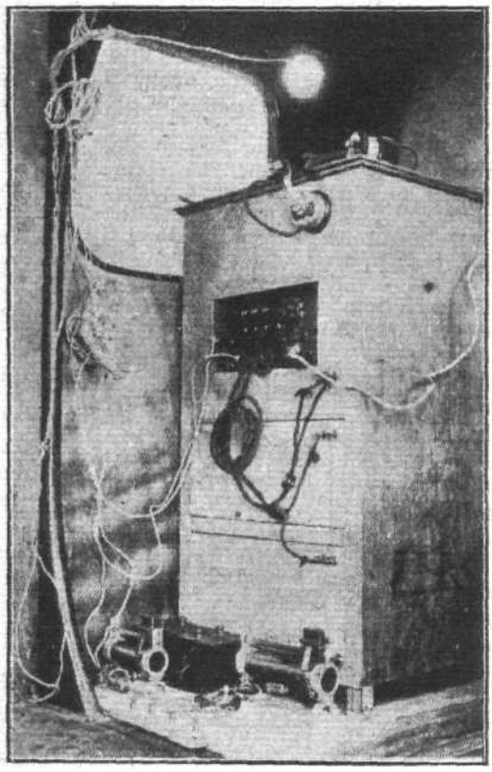
Aviation in Madagascar

AN aviation mission, representing the Société du Reseau Aérien Transafricain and under the direction of M. Poulalion, has, at the request of the Governor-General of Madagascar, been sent out to investigate the possibilities of an air route between Antsirabe, Morondava, and Tullear. Madagascar offers great possibilities for aviation: it is rich in products, but devoid of roads and railways, everything being transported by porters. Plans of the ground organisation for this air route have been submitted to the Governor-General, and it is hoped that the service will be ready by the end of 1924. The route is 750 kms. in length, and has landing grounds every 60 kms.

LEADER CABLE SYSTEMS FOR STEERING OF AEROPLANES

ALTHOUGH tests have now been proceeding in France for a couple of years or more on the "Leader Cable" invented by M. William Loth, comparatively little has become known in this country concerning the working and principle of this invention. In FLIGHT of March 16, 1922, we published a short article dealing with the Loth guide cable, giving such few particulars as were available at the time. Beyond that, however, little or nothing has been published in English relating to this interesting subject, and it was, therefore, with a good deal of anticipation that we visited the Royal Society of Arts, where, on December 14, M. Loth's paper on his leader



THE LOTH GUIDE CABLE : This photograph shows the receiver installation on an aircraft.

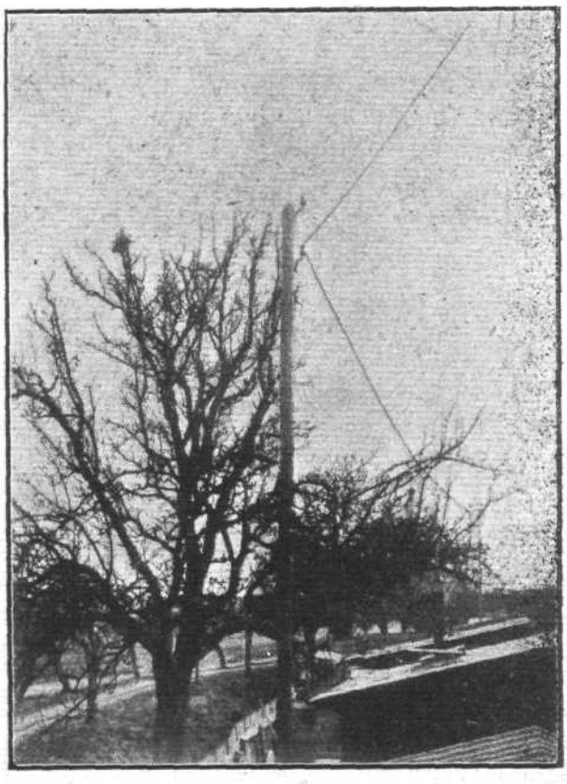
cable was read before the Institution of Aeronautical Engineers by Mr. John Gray, B.Sc., M.I.E.E., as the writer of the paper, although understanding English perfectly, does not speak it sufficiently well to be able to give a lecture. Mr. F. R. Simms was in the chair, and the lecture was very well attended.

Owing to the fact that the paper, as written by M. Loth, was a very long one, and that Mr. Gray could only deal with portions of it in the time available, we do not propose to give a *résumé* of the paper itself, nor an exact report of the short lecture delivered by Mr. Gray. Rather do we intend, in the following notes, to attempt to offer a brief explanation of the principles involved and the apparatus used, without necessarily following the sequence and method of either the author of the paper or of Mr. Gray. The original translation of the paper, and the lantern slides used, have been very kindly placed at our disposal by M. Loth and Mr. Gray, with, of course, the consent of the Institution of Aeronautical Engineers, and if, therefore, in the following notes any inaccuracies should be found, or any glaring omissions of important points, we alone must be held responsible.

Briefly, the Loth guide cable for aeroplanes is not new in principle, but the old idea of using a cable emitting electric current for guiding ships into harbour has been applied by M. Loth to the guiding of aircraft. M. Loth has been working on this subject for something like ten years, and quite early in his researches he became convinced that before he could hope to solve the problem it would be necessary to explore thoroughly the magnetic field surrounding such a cable. This he consequently set to work to do, and when it is stated that the magnetic field has been explored up to distances of 15 kilometres (9·3 miles) from the cable it will be realised that the task was a formidable one. However, M. Loth persevered, encouraged by the French aviation authorities, and notably by M. Laurent Eynac, Under-Secretary of State for Air, who placed machines and pilots at the disposal of the inventor. The experiments and mathematical studies of the shape of the magnetic field disclosed the fact that the field is not a simple magnetic field, but a resultant field formed by three elementary magnetic fields. These are : (1) the field due to the current flowing in the cable (this is the least important for guiding purposes) ; (2) the magnetic field due to the return current in the ground or sea ; (3) field due to the currents induced in the conducting mass surrounding the circuit.

The basic principle of the guide cable is shown diagrammatically in Fig. 1. At a station situated at one end of the guide cable used is an electric alternator producing an oscillating current of a certain frequency in the primary circuit. The secondary circuit consists of the guide cable (which can be placed either on poles above the ground or buried in the ground), the ends of which are led to earth plates and the return current passing through the earth. The station end of this cable has a secondary coil placed near the coil of the primary circuit. When, therefore, the alternator is working, the alternating current in the primary circuit induces an alternating current in the secondary circuit—*i.e.*, in the guide cable. For work over the sea the cable is laid on the bottom, as indicated in the diagram Fig. 2.

The alternating current in the cable and earth circuit produces a magnetic field, and if the aircraft to be guided is provided with suitable apparatus the variable magnetic field can be detected. For instance, ear phones may be employed, when a certain note, varying with the frequency of the circuit, will be heard. It has already been mentioned that the magnetic field surrounding a guide cable is not a simple one. Experiments have indicated that it is somewhat of the shape shown in Fig. 3, and that, therefore, according to where in this magnetic field the detecting apparatus is placed, it will be differently affected. The small crosses seen in Fig. 3 represent the coils of the receiving apparatus, mounted on the aircraft to be guided. Reference to these coils will be made later. For the present it may be stated that, fundamentally, the receiving apparatus consists of three separate coils, one longitudinal vertical coil, one transverse vertical coil, and one



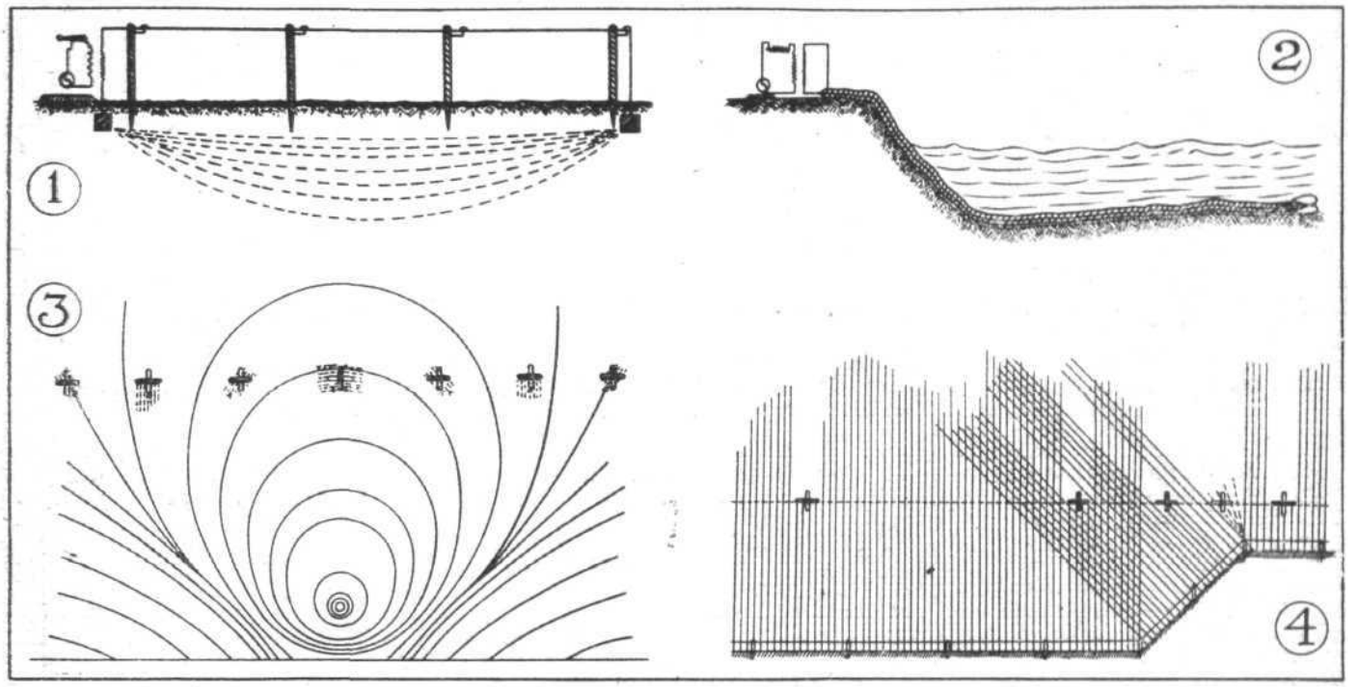
Photograph showing a portion of the guide cable surrounding the Villacoublay aerodrome.

horizontal coil. According to the position of the receiving apparatus in the magnetic field one of these coils will be more affected than the other two, and will thus give an indication of the relative position of the aircraft. As the guide cable, running across country, will not be in a straight line, but will

necessarily deviate to the right or left, as well as following the contour of the ground over hills and through valleys, it becomes important to be able to ascertain when such dips and rises are taking place. Otherwise, the pilot would receive a wrong impression of his position. Fig. 4 indicates how an aircraft approaching a hill over which runs the guide cable will be made aware of the fact. The dotted line indicates the path followed by the aircraft, and the crosses represent the coils of the detector circuit. While the cable is running horizontally the maximum is heard in the horizontal coil, while no signal is picked up by the vertical coil. On approaching the slope of the hill the vertical coil begins to pick up the signals, which here are produced by a changed magnetic field. As the brow of the hill is approached there is a short period during which neither coil picks up any signal, as the lines of flux diverge at this point. Finally, as the machine arrives off the horizontal top of the hill, or plateau, the signals again become normal—*i.e.*, maximum in the horizontal coil and *nil* in the vertical. This is the diagrammatic explanation of what happens. In practice, of course, the matter is more complicated.

(*i.e.*, when the coils are at right angles to the flux), and a minimum when the coils are at right angles to the cable. With this fundamental fact kept in mind, the action of the guide cable becomes fairly evident, at any rate in its main principles. Let us suppose that the aircraft is flying vertically above the cable. The greatest induced current will then be found in the vertical longitudinal and in the horizontal frames or coils, while there will be no current in the vertical transverse coil. The manner of ascertaining the signal strength in the various coils is by a series of switches joining up the coils in different ways. A slide of this wiring diagram was shown, but, unfortunately, this slide has lines so faint as to be entirely unsuitable for reproduction. It is, however, easily seen that by various combinations it is possible to ascertain the maximum signal strength, and from knowing in which coils this is obtained to discover the position of the aircraft in relation to the cable.

Briefly, then, any deviation of the aeroplane from the guide cable—*i.e.*, turning to the right or left—is discovered by alternately joining in series, in opposed directions, the vertical longitudinal and vertical transverse coils. According to



THE LOTH GUIDE CABLE : Diagrams representing basic principle of the invention. 1. The cable supported on poles, an alternating current being generated in it by the alternator shown on the left. 2. Submarine cable operating on similar principle, but the return being through the water instead of through the earth. 3. Lines representing the shape of the magnetic field surrounding the cable. The crosses represent the coils of the detector circuit mounted on the aircraft. 4. Shows the manner in which a pilot is made aware of his approach to a hill.

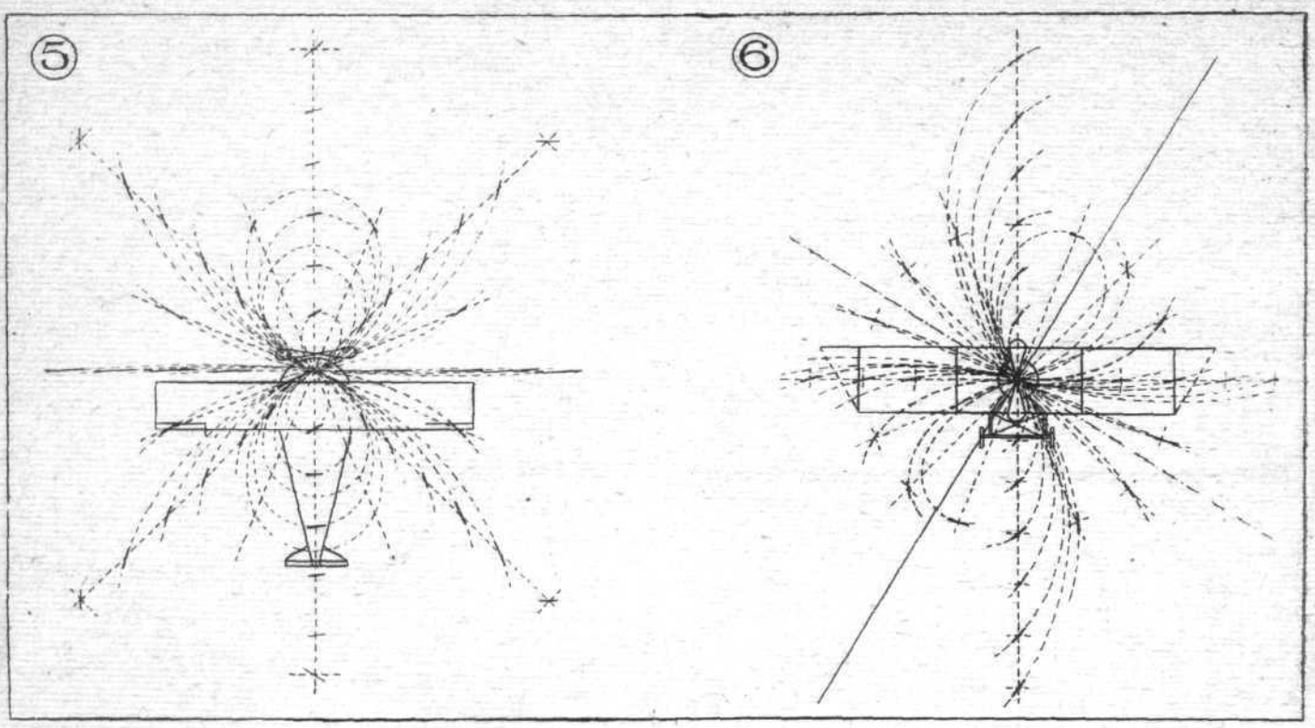
We will now turn to the receiving circuit mounted on the aircraft. As already indicated, this consists of three separate coils, and, of course, of the necessary detecting and amplifying apparatus. The coils are of the frame or panel type, not unlike the frame aerial familiar to most wireless amateurs. The function of these frame coils is, in fact, the same as that of the frame aerial used in direction finding, but, instead of movable frames, which would be too cumbersome to be used on an aircraft, the frames are permanently fixed, and the changes in direction are determined by coupling in series any two of the three coils. These are : one vertical longitudinal coil placed in the fore-and-aft direction of the aircraft ; one vertical transverse coil ; and one horizontal coil. Perhaps a better mental picture may be formed if we state that the longitudinal vertical coil might be, and we believe actually is, placed inside the vertical fin on the tail of the aircraft. Similarly, the horizontal coil may be placed inside the fixed tail plane, while the transverse vertical coil is incorporated in the tail plane bracing. The placing of the three coils in or near the tail is chosen in order to get the coils as far removed as possible from local disturbances caused by the magnetos, generators, etc., carried on the aircraft. Reference to this will be made later.

In trying to follow the action of the guide cable and detecting coils, it should be remembered that, as the flux produced by the guide cable is at right angles to the cable, the current induced in the receiving coils on the aircraft will be a maximum when the coils are parallel to the cable whether the machine is turning to right or left, the signal strength will depend upon whether the coils are so joined as to oppose or assist each other. Thus any deviation of the machine is indicated at once. Not only the fact that the machine has turned, but also the direction in which it has turned.

If the aircraft has been drifted away, sideways, from the guide line, but is still flying parallel to it, an indication of the fact is provided in the first place by the reduction in signal strength. It is, however, also possible to detect this drift by means of the coils. In this case use is made of the longitudinal vertical frame and the horizontal frame, which are joined in series, first in one direction and then in the opposite direction, by means of the switches provided. Just as in the case of angular deviation from the cable the right or left were indicated by the manner in which the coils had to be joined, so in the case of drift without angular deviation can the direction in which the machine has drifted—*i.e.*, right or left—be ascertained.

There now remains a third contingency, the approach to or receding from the cable in a vertical direction. This may occur when the cable is horizontal by the aeroplane gaining or losing height, or it may occur while the machine is following a straight horizontal flight path, but the cable itself is running over a hill or through a valley. Diagram 4 shows how the magnetic field is changed in the latter case. For detecting such a change in the direction of the cable use is made of the transverse vertical frame and the horizontal frame. As

before, according to the manner of joining the coils, an indication is given of whether the cable rises or recedes. It will be seen that if a pilot is flying over a familiar route, and knows the various localities where the cable rises or falls, this fact will at once enable him to know his whereabouts. On the other hand, a pilot following an unfamiliar route provided with the guide cable would probably attempt to fly always



THE LOTH GUIDE CABLE : 5. Shows in plan view the form of the magnetic field caused by the magnetos, generators, etc., of an aircraft, while Fig. 6 shows the field in front elevation.

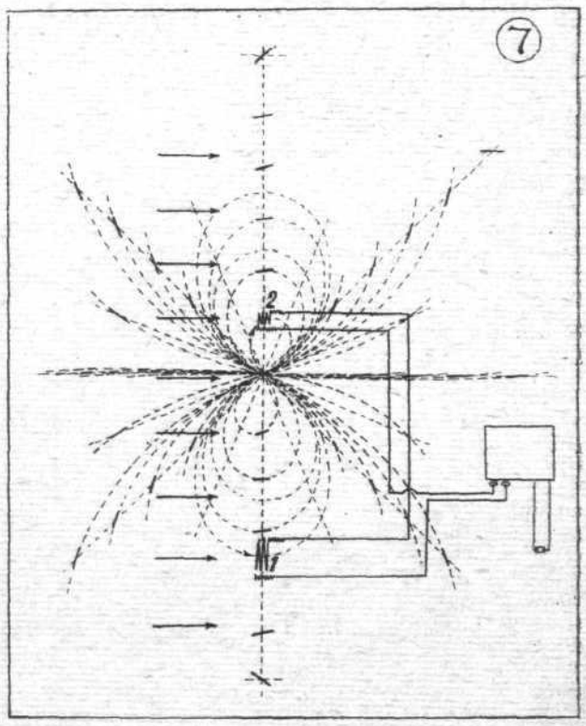
vertically over, and at a constant height above, the cable thus following it in its rises and falls. In other words, he would follow the contour of the ground, climbing when he came to a hill and dropping when over a valley. A pilot on a familiar route could probably dispense with these deviations from the horizontal.

The three deviations from the guide cable—angular deviation, drift, and vertical distance—are the three factors which it is necessary to know. In practice, of course, any combination of the three would be possible, but we understand that a pilot, after a little experience, has no difficulty in following a cable which he cannot see.

Reference has been made to the trouble experienced from local disturbances caused by the magnetos, generators, etc., on an aircraft. Originally, we believe, M. Loth overcame this difficulty by a form of interrupter gear, which broke the receiving circuit at the moment when a spark occurred. The frequency was so high that these interruptions were not noticed by the human ear, and the signals from the guide cable came in apparently uninterrupted. Now, however, another method has been evolved for getting rid of interference. This takes the form of smaller coils, termed compensating coils, placed near the source of the disturbance, and joined up to the coils of the receiving apparatus in such a manner that the currents induced in the latter by the magnetos, etc., are opposed by those induced in the compensating coils and thus nullified. Before M. Loth was able to effect this apparently simple cure he had to explore the magnetic field created by the electric apparatus on the machine, and during these experiments he found that the placing of the compensating coils depended to a certain extent upon whether the magnetos were placed parallel with or at right angles to the line of flight of the aircraft. He has now determined the necessary positions in any given installation, and the interference from local electric disturbances can definitely be said to have been eliminated. Not only so, but we believe M. Loth has actually experimented with a special type of magneto, which does not give rise to any disturbance, and which, therefore, renders the compensating coils superfluous.

As regards the receiving apparatus on the aircraft, other than the three coils, this may be of various forms. For instance, a series of coloured lights might be used, or even dial and needle instruments, but it has been found that the simplest and most satisfactory way is to use ear phones, the faint signals coming in from the cable being magnified by suitable valve amplifiers. Moreover, the outfit does not interfere with the ordinary wireless outfit, and can be made supplementary to it.

There is a wide scope of choice in the manner of using the Loth system, and at present it has been found that signals can be picked up, using a current frequency of 800 per second, at a horizontal distance of up to 15 kilometres (9·3 miles), and at a height of 3,000 metres (10,000 ft.). A continuous cable may be used, or stations situated a considerable distance apart may be surrounded by a cable in which the frequency is much higher, something like 50,000 per second, when the range is greatly increased. This might be an advantage in that it would enable a pilot to know, some considerable time beforehand, when he was approaching an aerodrome.



In Fig. 7 is indicated how a small coil placed near the source of disturbance, i.e. in the vicinity of the magnetos, may be used for opposing the effects, in one of the large coils of the receiving circuit, of the magneto disturbance.

It has been mentioned that the guide cable may either be mounted on poles or buried in the ground. In the experiments an overhead cable was used, but this was for cheapness mainly. The buried cable is as effective, and is, of course, safe from the effects of frost, gales, etc.

In the practical application of the Loth guide cable system there would seem to be certain objections and drawbacks. For instance, machines following such a cable, say between London and Paris, might be in considerable danger of colliding, although the inventor claims that if incoming traffic kept to one side of the cable and outgoing to the other this danger should not be great. There still remains, however, the problem of a fast machine overtaking a slower one. Another very important point is that the cost of erecting the cable line would be considerable. There is not only the cost of establishing the line, but the question of purchase of "right of way" from the owners of the land over which the line runs. Personally, we believe that as soon as it became known that such a line was to be established the price of land would go up enormously. We believe this was actually the experience of the French, but that after special legislation had been passed the difficulty was overcome.

During the discussion that followed the reading of M. Loth's paper certain points were brought out which may be of interest. For instance, it was stated that no interference with existing telephone and telegraph lines had been found to take place when the leader cable was working, even when such lines were in fairly close proximity to the cable. With regard to the precision obtained in locating an aircraft in relation to the guide cable, it was stated that the distance from an aircraft passing above the cable could be determined to within 10 metres, so that for assisting a pilot in landing on an aerodrome covered in fog the cable should be very useful.

The Loth cable has, as already mentioned, attracted considerable attention in France, and a commencement has been made with laying a cable on the Paris-London line. The first section of this line, work upon which has been commenced, will be of 20 kilometres in length, and will extend from le Bourget to Leszarches. This portion will be erected during 1924. The French Government has budgeted for four guide lines to be put up in France: the Paris-London already referred to, a Paris-Brussels, a Paris-Strasburg, and a fourth from Paris to Versailles. Experiments are also to be made in Belgium. At present it seems that British authorities have not taken a great deal of interest in the Loth cable, but, presumably, by the time the French section of the line is laid as far as Boulogne, and experience has been gained with its working, we shall begin to consider the matter on this side of the Channel. At present it is gathered that the official view held here is that the ordinary direction-finding wireless offers a simpler immediate solution to the difficulty of flying in fog or in the dark. Nevertheless, we do suggest that experiments with surrounding aerodromes with a guide cable should be made, as the cost of so doing would, presumably, not be very great, and the utility might be very considerable.

The Institution of Aeronautical Engineers is to be congratulated upon having obtained a paper on this very fascinating subject, and we are sure our readers will join us in expressing our appreciation of the very valuable pioneer work done by M. Loth, and in thanking him for having enabled British readers of FLIGHT to form an idea of the fundamental principles of his most interesting invention.

THE ROYAL AIR FORCE

London Gazette, December 18, 1923

General Duties Branch

The following are granted permanent commns. as Flight Lieuts. (Dec. 19) :—R. A. de Haig, J. W. Jones, A. D. Pryor.

Flying Offr. J. G. Hannay (Lieut., A. and S. Highrs.) relinquishes his temp. commn. on return to Army duty; Nov. 29.

Stores Branch

Flying Offr. E. K. Greenhow, M.C., is granted perm. commn. in rank stated for accountant duties; Dec. 19.

Medical Branch

W. Parsons is granted short service commn. as Flt. Lieut., with effect from, and with seny. of, Dec. 3. Capt. J. Speak, Dental Surgeon, General List, Army, is granted a temp. commn. as Flt. Lieut. on attachment to R.A.F., with effect from, and with seny. of, Dec. 1. He will continue to receive emoluments from Army funds. Flt. Lieut. O. Armer relinquishes his temp. commn. on ceasing to be empld.; Nov. 30.

Reserve of Air Force Officers

Pilot Offr. W. F. A. Snell is transfd. from Class A to Class C; Dec. 16. The following Offrs. are confirmed in rank, with effect from the dates indicated :—*Flying Offrs.*—A. E. Francis; Nov. 22. A. M. Alexander, A.F.C., G. Colledge; Nov. 29. *Pilot Offrs.*—R. C. Knowles; Oct. 20. R. R. H. Taylor; Nov. 1. T. P. Jenkins; Nov. 22. C. W. Calder; Nov. 27. J. E. Taylor, W. A. Warwick; Nov. 29. J. F. Turpie; Nov. 30.

Memorandum

J. N. H. Brooke is granted a temp. commn. as Pilot Offr. for duty with Electrical Services Works Company under Directorate of Works and Buildings; Nov. 3.

ROYAL AIR FORCE INTELLIGENCE

Appointments.—The following appointments in the Royal Air Force are notified :—

General Duties Branch

Squadron Leader H. E. M. Watkins, A.F.C., R.D., to H.Q., Malta. 1.12.23.

Flight Lieutenants : H. Stewart, to H.Q., Inland Area, on transfer to Home Estab. 5.12.23. J. C. M. Hay, to R.A.F. Depot, on transfer to Home Estab. 1.12.23.

Flying Officers : A. J. E. Broomfield, D.F.C., to No. 28 Sqdn., India, instead of to No. 27 Sqdn., as previously notified. 15.10.23. E. B. Addison, to Aircraft Park, India. 15.11.23. A. G. Hill, to R.A.F. Depot, on appointment to a short service commn. 13.12.23.

Stores Branch

Flying Officer C. J. Elliott, to C. and M. Party, Digby. 13.12.23.

Medical Branch

Flight Lieutenant T. R. S. Thompson, M.B., to Egyptian Group H.Q. 22.11.23.

Christmas Greetings

THE Editor desires to thank all the numerous Air Stations and Establishments who have sent Christmas Greetings. We are just left wondering whether the craft depicted in the card of the Experimental Flying Department of the Royal Aircraft Establishment at Farnborough are suggestive of how "the boys" are looking forward to going home upon the festive day.

A New Glue for Aeroplane Use

A HIGHLY water-resistant blood albumin glue which can be applied without the use of a hot press has been invented by A. C. Lindauer, of the Forest Products Laboratory, U.S. Forest Service. The development of this glue is the latest and most promising advance made as a result of the long-continued search by the Government Laboratory for a satisfactory waterproof glue for wood.

The blood glues now used show considerable resistance to moisture, but all require pressing in a press with steam-heated plates, a relatively slow process calling for very expensive equipment. The new glue, which is made by the addition of paraformaldehyde and ammonia to blood albumin, can be used with presses of the same sort used in glueing with animal, vegetable, or casein glues.

The cold-press blood glue has greater water-resistance than any casein or blood glue hitherto tested by the Laboratory, and has sufficient strength for use in ply-wood. Ply-wood test specimens which were placed in the fungus pit of the Forest Products Laboratory under conditions of excessive humidity for a period of one year, required a shearing force of 300 lbs. to break them apart, and specimens submerged in water for a period of one month proved to be equally strong. The U.S. Navy specifications for water-resistant ply-wood specimens of the same type call for a strength of 180 lbs. after soaking for two days. The fungus pit condition endured for even a few months is known to be more severe than the two-day submergence test.

Not only can this glue be successfully used in making ply-wood from thin veneer, but it has given excellent results with lumber of spruce and other species of low shearing strength. It cannot yet be recommended for glueing thick veneer or lumber of heavy dense woods, such as ash, maple, birch, and oak.

The ease with which the new blood glue can be spread and moulded and its high water-resistance may lead to uses parallel to those of the numerous synthetic gums and rubbers of similar composition.

In accordance with the usual custom in cases where patents are granted on the results of Government research, the new glue formula is dedicated by the Forest Products Laboratory to the free use of the public.

BY DOUGLAS B. ARMSTRONG

Air Post in Uruguay

FROM Montevideo comes the report of a special air mail flight from Sarandi (Dept. Florida) to the capital by the aviator Adami on October 12, 1923, in connection with the national fêtes celebrating the anniversary of the Battle of Sarandi. Letters carried on this flight bore, in addition to the special 25 c. aero stamp overprinted in green, examples of some commemorative postage stamps issued for the occasion, and these were obliterated with a souvenir postmark.

The Uruguayan air post service was formally inaugurated on December 17, 1921, but prior to that date several experimental trips had taken place. The earliest of these was between Montevideo and Salto, on August 25, 1912, when letters conveyed by air were impressed with a special cancellation inscribed "Correo Aereo," together with the names of the two towns and the date of the flight.

About 300 letters are said to have been carried on another trial flight, promoted by the Aero Club of Uruguay, in conjunction with the Ministry of Posts, from Montevideo to Rocha *via* Pariapolis on March 22, 1921. The pilot failed to complete his course and the mail was actually forwarded from Piriapolis by rail. It was upon this occasion that the first Uruguayan air post stamp was issued, in the form of the 25 centavos denomination of the regular postage series 1900/09, overprinted with the device of a miniature aeroplane, surmounting the words "Correo Aereo" in bronze-blue. Of the 15,000 stamps thus distinguished, a solitary sheet of 100 was inadvertently overprinted in *black* instead of bronze-blue.

An equal number of aero stamps bearing a red overprint was prepared on the occasion of another experimental flight from Montevideo and Mercédès on November 12, 1921, when some 150 letters were carried. This variety exists also with the overprint inverted, in which form it is, however, extremely rare.

The present green overprinted stamp was brought into use in connection with the short-lived mail service between Montevideo and Buenos Ayres some time in May, 1922. A requisition for a further supply of 8,000 "Correo Aereo" stamps, overprinted in yellow, was cancelled owing to the suspension of the trans-La Plata air post.

First Siamese Air Postmark?

AN official record of the air post in Siam, recently published by the Siamese Government, contains the interesting information that the first experiment in aerial transport of mails in that country took place in 1920, between Bangkok and Chandhaburi. No reference is made, unfortunately, to the stamps or postmarks employed on that occasion, although in his monograph on "Air Post Stamps" Brig.-Gen. Ridgway refers to the use of contemporary Siamese stamps overprinted with the device of a mythical bird covering a block of four specimens. We have ourselves heard of this "Garooda" (bird-man) imprint, but as a postmark rather than an overprint, but have never actually seen it. Can any reader of FLIGHT produce one?

Readers are invited to forward to the Editor of FLIGHT *letters, etc., bearing aerial stamps or postmarks for mention in this column, as well as out-of-the-way varieties, etc.*

We shall also be pleased to hear from correspondents interested in air-stamp collecting, and to answer any queries.

⁂ ⁂ ⁂ ⁂

Supermarines in London

THE Supermarine Aviation Works, Ltd., of Southampton, notify us that they have now opened a London office at Broadway Court, Broadway, Westminster, S.W. 1. Their temporary telephone number for address is Victoria 4664. Southampton being somewhat out of the aviation business centre, this move should be of considerable advantage.

SIDE-WIND

MESSRS. GEORGE PARNALL AND CO. held their annual staff dinner at the Crown Restaurant, Bristol, on the 13th instant. Mr. George G. Parnall—who presided over a most successful and enjoyable affair—spoke of the firm's optimistic outlook on the prospect of aviation. His remarks evinced the firm's zeal and determination to accomplish the very best in the way of design and workmanship in aircraft. This, of course, had been abundantly proved by the success of the Parnall "Pixie" in the recent competitions.

The Chairman read a telegram from Captain Norman Macmillan, whose unavoidable absence was regretted by all in the recollection of his contribution to the jollity of the previous year's dinner.

The toasts of the evening from members of various departments provided considerable amusement by their sporting rivalry, and a fine musical programme concluded the evening.

⁂ ⁂ ⁂ ⁂

PUBLICATIONS RECEIVED

Le Reglage de la Distribution des Moteurs a Explosion. By Albert Eteve. Paris: Lanore et Ducrot, 48, Rue d'Assas. Price 15 francs.

Parnall "Pixie" Light Aeroplane. George Parnall and Co., Coliseum Works, Park Row, Bristol.

Department of Overseas Trade. Report on the Economic Conditions in Cuba, dated September, 1923. By D. St. Clair Gainer. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 1*s.* net.

Colonial Reports, Annual: No. 1182.—Uganda Report for 1922. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 6*d.* net.

Pictorial Calendar, 1924. The Gloucestershire Aircraft Company, Ltd., Cheltenham.

Aeronautical Research Committee Reports and Memoranda: No. 878 (*E.*7).—Phase Setting of Engine Indicators. By H. Moss and W. J. Stern. June, 1923. London: H.M. Stationery Office, Kingsway, W.C. 2. Price 4*d.* net.

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NEW COMPANY REGISTERED

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